

# Description

## TURNING MIRROR

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a division of and claims domestic priority to my U.S. Non-Provisional Patent Application No. 09/360,267 filed on July 26, 1999, entitled TURNING MIRROR, which is still pending and incorporated herein by reference; and further claims domestic priority to my Provisional Patent Application No. 60/100,717 filed September 17, 1998, also entitled TURNING MIRROR, also incorporated herein by reference. No new matter has been introduced into the present application.

### SUMMARY OF INVENTION

[0002] The TURNING MIRROR is a mirror in which the reflection rotates with the mirror's frame. The Turning Mirror can be used as a toy and in displays and for other purposes.

[0003] As is well known in the art, two planar mirrors arranged in plan to form a right angle (i.e., joined at 90-degrees about a vertical axis) will produce a non-reversed (i.e., not

"mirror image") mirror image. In such a mirror arrangement, one's left eye, e.g., will appear as the left eye of one's reflection. The mirrors are preferably first-surface to minimize the mirrors' junction and, therefore, to minimize any discontinuity at the centerline of the reflected image.

[0004] To further disguise any apparent centerline, the mirrors may be scored at regular (or irregular) intervals, parallel to the centerline.

[0005] If, however, such a mirror arrangement is rotated (such that the joint is no longer vertical), the reflected image will also be rotated. If, e.g., one looks at one's reflection in such a mirror arrangement and rotates the arrangement so that the joint becomes horizontal, one's reflection will be inverted.

[0006] For some uses it may be sufficient (and particularly economical) to simply join mirrors at 90-degrees along a horizontal line. The mirrors will invert the reflections of passersby.

[0007] For most uses it is preferred to rotatably mount the mirror assembly. The axis of rotation preferably passes perpendicularly through the center of the mirror joint, at 45-degrees from each mirror. Rotation is preferably manual, but may be motorized by ordinary means. A housing

for the mirror assembly is preferred in order to disguise the special structure of the mirror and to protect it.

[0008] As was discussed above, as the mirror joint is rotated to horizontal, the reflection becomes inverted. It is therefore apparent that the reflection rotates twice as fast as the mirror assembly (or mirror assembly in housing) itself.

[0009] It is, however, preferred that the reflection appear to rotate along with the mirror assembly. The reflection thus seems to be "stuck" to the assembly. Without modifying the optical structure, this illusion can be created by rotatably mounting the mirror assembly within a preferred housing. The mirror assembly and housing are coupled so that the housing rotates twice as fast as the mirrors. The most visible elements, the reflection and housing, therefore rotate at the same rate, resulting in a compelling illusion.

#### **BRIEF DESCRIPTION OF DRAWINGS**

[0010] FIG. 1 is a side section through the center of a preferred embodiment of the Invention.

[0011] FIG. 2 is a front elevation of the preferred embodiment of FIG. 1.

[0012] FIG. 3 is a side section through the center of an alternate embodiment of the Invention.

- [0013] FIG. 3A is a rear elevation of the alternate embodiment.
- [0014] FIG. 3B is a front elevation of the alternate embodiment.
- [0015] FIG. 4A is a front elevation of a preferred embodiment of the two mirrors of the Invention.
- [0016] FIG. 4B shows the shape of one of these mirrors.
- [0017] FIG. 5 is a more accurate delineation of the shape indicated in FIG. 4B, for the preferred embodiment of Figures 1 and 2.

#### **DETAILED DESCRIPTION**

- [0018] Referring particularly to FIG. 1, with same numbers indicating same parts:
- [0019] The preferred Turning Mirror apparatus 10 is comprised of a housing 100, a mirror assembly 200, and a gearbox 300.
- [0020] Housing 100 is primarily a tube 110 which may be of any convenient material, preferably lightweight, economical, and durable, such as cardboard or suitable plastic. Back cover 120, also of any convenient material, such as wood or cardboard, is fitted to close one end of tube 110 and may be fastened in place. Front cover 122 is similar to back cover 120, but contains a window 150 through which mirror assembly 200 can be seen. The (maybe patterned)

window is preferably covered with clear plastic, such as acrylic, to protect mirror assembly 200.

[0021] Flange 130, which can simply be a wood disc, is mounted to shaft 390 of gearbox 300 (as will be discussed below) and is fitted and connected, as by peripheral screws, to tube 110.

[0022] Mirror assembly 200 is comprised of similar first surface mirrors 210 and 212, one of which is slightly smaller, as shown in FIG. 5. As shown in FIG. 4A, optional lines 250 on mirrors 210 and 212 are parallel to the centerline (passing through C), and, therefore, serve to disguise the true nature of the centerline as the apex of the right angle between the mirrors.

[0023] Mirrors 210 and 212 are preferably glued to right angle support 220 which may be made as glued up wood blocks. Right angle support 220 is fitted over shaft 380 of gearbox 300 and secured with pin, such as a roll pin, 230.

[0024] As shown in Figures 4A, 4B, and 5, mirror assembly 200 is fitted to the cylindrical housing 100 by projecting the circular cross section of tube 110 onto mirror assembly 200 to define a half elliptical shape for each mirror 210 or 212. Mirror 210 is slightly smaller than mirror 212 to accommodate the overlap at the 90-degree joint between

mirrors.

[0025] Shaft 390 of gearbox 300 is tightly fitted to flange 130 and may be further fastened as by staking. In the preferred embodiment, components of gearbox 300 preferably include aluminum support plates, aluminum gears, and shafts of readily machinable steel. Bushings of plastic or oil impregnated bronze support the rotatable components.

[0026] Support plates 310 and 312 are spaced from one another by spacers 320 and 330, which are each drilled and tapped at each end, and secured by screws.

[0027] Spacer 330 is heavier to cause gearbox 300 to orient itself with spacer 330 at the bottom (as gearbox 300 is essentially free to rotate about shaft 390).

[0028] In operation, housing 100 is held so that window 150 is essentially vertical by a user 500 in such a way that the user can see his or her reflection in the mirror. Housing 100 supports gearbox 300 via flange 130 and shaft 390 and mirror assembly 200 via shaft 380. Spacer 330 will hang downward. The beginning orientation of mirror assembly 200 is not significant.

[0029] The user 500 rotates housing 100 generally about the axis of tube 110. The orientation of gearbox 300 remains

essentially constant so the rotation of housing 100 is transferred through flange 130 and shaft 390 to gear 350 which is firmly fastened, as by staking, to shaft 390.

[0030] Gear 350 turns same diameter gear 355 and gear 360 which is pinned to and turns with gear 355. Gear 360 in turn drives gear 370 which is twice its diameter. Gear 370 is firmly fastened, as by press fit, to shaft 380 which thereby causes mirror assembly 200 to rotate at half the rate of housing 100. The reflection will rotate at the same rate and in the same direction as housing 100.

[0031] In the alternate embodiment 12 of FIG. 3, housing 100' does not enclose gearbox 300' which is instead mounted in upright 420 which is tiltably mounted to foot 410 of base 400. Gearbox 300' obviously does not require a weight to remain vertical.

[0032] It will be apparent to one skilled in the art that many of the details described above are not central to the Invention. Gears may, for example, be replaced by friction wheels or sprockets with chain or belts. The mirrors need not be elliptical nor so closely fit the housing. Gearing may be deleted for an inferior, but still useful, effect. Size is of little consequence.

[0033] In general, while the Invention has been described with

reference to specific embodiments thereof, it will be appreciated by those of ordinary skill in the art that modifications can be made to the Invention without departing from the spirit and scope thereof.